

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF THE CLAIMS:

1. (withdrawn) A semiconductor laser element comprising:
 - a semiconductor substrate,
 - an active layer formed over the semiconductor substrate,
 - a ridge having a clad layer formed on the active layer and a contact layer formed over the clad layer,
 - an insulation film covering the side surfaces of the clad layer, and
 - an electrode connected to the contact layer,
wherein the insulation layer has an end portion in the ridge thickness direction located between the upper surface and the lower surface of the contact layer.

2. (withdrawn) A semiconductor laser element as claimed in Claim 1, wherein
the electrode is formed over the active layer so as to cover the ridge, and

the insulation film is arranged between the side surface of the ridge and the electrode.

3. (withdrawn) A semiconductor laser element as claimed in Claim 1, wherein

the contact layer has an upper surface having a width greater than a width of a lower surface.

4. (withdrawn) A semiconductor laser element manufacturing method comprising:

a step of forming an active layer over a semiconductor substrate,

a step of forming a ridge having a clad layer formed on the active layer and a contact layer formed over the clad layer,

a step of forming an insulation film covering the side surfaces of the clad layer and having an end portion in the ridge thickness direction located between the upper surface and the lower surface of the contact layer, and

a step of forming a electrode over the insulation film so as to be connected to the contact layer.

5. (withdrawn) A semiconductor laser device comprising a semiconductor laser element including: a

semiconductor substrate, an active layer formed over the semiconductor substrate, a ridge having a clad layer formed on the active layer and a contact layer formed over the clad layer, an insulation film covering the side surfaces of the clad layer, and an electrode connected to the contact layer, wherein the insulation layer has an end portion in the ridge thickness direction located between the upper surface and the lower surface of the contact layer.

6. (currently amended) A semiconductor laser element manufacturing method, comprising:

- (a) a step of forming a plurality of semiconductor layers on a semiconductor substrate;
- (b) a step of forming a first semiconductor layer over the plurality of semiconductor layers;
- (c) a step of forming a contact layer consisting of including a second semiconductor layer over the plurality of semiconductor layers;
- (d) a step of selectively removing a portion of the contact layer to form a contact portion; and
- (e) a step of selectively removing a portion of the first semiconductor layer to form a ridge including said contact portion and a remaining portion of the first semiconductor layer beneath said contact portion, wherein

~~the with an upper surface of the said contact portion layer has having a first direction width greater than a first direction width of said remaining portion of the first semiconductor layer after the step (e).~~

(f) a step of forming an insulating film over said semiconductor substrate so as to cover an upper surface and sidewalls of said ridge; and

(g) a step of removing the insulating film across a first direction width of the upper surface of said ridge such that the sidewalls of said ridge remain substantially covered by the insulating film.

7. (cancelled)

8. (currently amended) A semiconductor laser element manufacturing method as claimed in Claim 6 ~~7~~, further comprising:

(h) a step of forming an electrode from Au which is electrically connected to the contact layer~~portion~~.

9. (cancelled)

10. (currently amended) A semiconductor laser element manufacturing method as claimed in Claim 6, wherein

~~after the step (e), said first direction width of the upper surface of the contact layer portion is has a width in a first direction greater than a first direction width of the a lower surface of the contact portion layer in the first direction.~~

11. (currently amended) A semiconductor laser element manufacturing method as claimed in Claim 6 ~~7~~, wherein step (a) includes:

(a1) a step of forming an n-type clad layer over the semiconductor substrate;

(a2) a step of forming an active layer over the n-type clad layer; and

(a3) a step of forming a first p-type clad layer over the active layer.

12. (original) A semiconductor laser element manufacturing method as claimed in Claim 11, wherein the first semiconductor layer in step (b) is a second p-type clad layer.

13. (currently amended) A semiconductor laser element manufacturing method as claimed in Claim 6, wherein: the contact layer is formed from InGaAs;

the first semiconductor layer is formed from InP_i, in step (d), the wet etching method is performed by using an etching solution containing 1% or more of H₃PO₄, H₂O₂ and

in step (e), the wet etching is performed by using an etching solution capable of taking achieving a selection ratio with respect to the contact layerportion.

14. (cancelled)

15. (withdrawn) A semiconductor laser element comprising:

a plurality of semiconductor layers formed over a semiconductor substrate,

a ridge having a first semiconductor layer formed on the plurality of semiconductor layers and a contact layer formed over the first semiconductor layer,

an insulation film covering the side surfaces of the ridge in a first direction, and

an electrode connected to the contact layer,

wherein the upper surface of the contact layer has a width in the first direction greater than a width of the lower surface of the contact layer in the first direction.

16. (withdrawn) A semiconductor laser element comprising:

a plurality of semiconductor layers formed over a semiconductor substrate,

a ridge having a first semiconductor layer formed on the plurality of semiconductor layers and a contact layer formed over the first semiconductor layer,

an insulation film covering the side surfaces of the ridge in a first direction, and

an electrode connected to the contact layer,

wherein the upper surface of the contact layer has a width in the first direction greater than a width of the lower surface of the contact layer in the first direction and greater than a width of the first semiconductor layer in the first direction.

17. (new) A semiconductor laser element manufacturing method as claimed in Claim 6, comprising:

forming a mask layer to cover said insulating film at both sides of said ridge and to expose said insulating film on said ridge before the step (g); and

removing said insulating film using said mask layer as a mask in the step (g).

18. (new) A semiconductor laser element

manufacturing method as claimed in Claim 17, wherein said insulating film is removed by using anisotropic etching in the step (g).

19. (new) A semiconductor laser element

manufacturing method, comprising:

- (a) a step of forming a plurality of semiconductor layers on a semiconductor substrate;
- (b) a step of forming a first semiconductor layer over the plurality of semiconductor layers;
- (c) a step of forming a contact layer including a second semiconductor layer over the plurality of semiconductor layers;
- (d) a step of selectively removing a portion of the contact layer to form a contact portion;
- (e) a step of selectively removing a portion of the first semiconductor layer to form a ridge including said contact portion and a remaining portion of the first semiconductor layer beneath said contact portion, with an upper surface of said contact portion having a different first direction width than a first direction width of a lower surface of said contact portion;
- (f) a step of forming an insulating film over said

semiconductor substrate so as to cover an upper surface and sidewalls of said ridge; and

(g) a step of removing the insulating film across a first direction width of the upper surface of said ridge such that the sidewalls of said ridge remain substantially covered by the insulating film.

20. (new) A semiconductor laser element manufacturing method as claimed in Claim 19, wherein said width of said lower surface of said contact portion is greater than said width of said upper surface of said contact portion.

21. (new) A semiconductor laser element manufacturing method as claimed in Claim 19, wherein said width of said upper surface of said contact portion is greater than said width of said lower surface of said contact portion.

22. (new) A semiconductor laser element manufacturing method as claimed in Claim 19, wherein the sidewalls of said remaining portion of the first

semiconductor layer beneath said contact portion are substantially parallel to each other.

23. (new) A semiconductor laser element manufacturing method as claimed in Claim 6, wherein the sidewalls of said remaining portion of the first semiconductor layer beneath said contact portion are substantially parallel to each other.